

CLAIMS

Having thus described the aforementioned invention, we claim:

1. An apparatus for providing backlight illumination of an image, said apparatus comprising:

5 a glass substrate having a front surface and a rear surface,

an opaque border adhered to said rear surface, said opaque border having an inside aperture whereby a selected portion of the image is illuminated;

a plurality of conductive traces adhered to said opaque border;

10 at least one light emitting device adhered to said rear surface, each of said at least one light emitting device in electrical connection with at least a pair of said plurality of conductive traces, said plurality of conductive traces and said at least one light emitting device forming an illumination circuit;

a means for supplying power to said illumination circuit;

15 a sheet proximal said front surface of said substrate, said sheet including the image to be illuminated; and

a back board having a reflector, said back board positioned proximal to and separated from said rear surface of said substrate, said reflector on a surface of said back board proximal said rear surface.

20 2. The apparatus of Claim 1 further including a dropping resistor adhered to said opaque border, wherein said at least one light emitting device includes at least one light emitting diode, said dropping resistor in electrical connection with at least a pair of said plurality of conductive traces, said plurality of conductive traces, said at least one light emitting device, and said dropping resistor forming said illumination circuit.

3. The apparatus of Claim 2 wherein said dropping resistor is formed from a resistive polymer thick film ink.

4. The apparatus of Claim 2 wherein said dropping resistor is a surface mount component having a selected resistance.

5 5. The apparatus of Claim 1 wherein said plurality of conductive traces are formed of a conductive polymer thick film ink.

6. The apparatus of Claim 1 further including a plurality of spacers separating said back board from said rear surface.

10 7. The apparatus of Claim 1 further including a light barrier between said back board and said rear surface.

8. The apparatus of Claim 1 further including a frame in which said substrate, said sheet, and said back board are secured, said frame having an opening for viewing the image.

15 9. The apparatus of Claim 1 wherein said means for supplying power includes a power connector adhered to said substrate, said power connector in electrical connection with a pair of said plurality of conductive traces.

10. The apparatus of Claim 1 wherein said means for supplying power includes a battery holder adhered to said substrate, said battery holder in electrical connection with a pair of said plurality of conductive traces.

20 11. An apparatus for providing backlight illumination of an image, said apparatus comprising:

a substrate having a front surface and a rear surface,

a plurality of conductive traces adhered to said rear surface, said plurality of conductive traces formed of a conductive polymer thick film ink; and

at least one light emitting device adhered to said rear surface, each of said at least one light emitting device in electrical connection with at least a pair of said plurality of conductive traces, said plurality of conductive traces and said at least one light emitting device forming an illumination circuit.

12. The apparatus of Claim 11 further including a dropping resistor adhered to said opaque border, wherein said at least one light emitting device includes at least one light emitting diode, said dropping resistor in electrical connection with at least a pair of said plurality of conductive traces, and said plurality of conductive traces, said at least one light emitting device, and said dropping resistor forming said illumination circuit.

13. The apparatus of Claim 11 further including an opaque border adhered to said rear surface, said substrate is formed of glass, and said opaque border is positioned between said substrate and said plurality of conductive traces.

14. The apparatus of Claim 11 further including a means for supplying power to said illumination circuit.

15. The apparatus of Claim 11 further including a power connector adhered to said substrate, said power connector in electrical connection with a pair of said plurality of conductive traces.

16. The apparatus of Claim 11 further including a battery holder adhered to said substrate, said battery holder in electrical connection with a pair of said plurality of conductive traces.

17. The apparatus of Claim 11 further including a sheet proximal said front surface of said substrate, said sheet including the image to be illuminated.

18. The apparatus of Claim 11 further including a back board, said back board positioned proximal to and separated from said rear surface of said
5 substrate.

19. The apparatus of Claim 18 further including a plurality of spacers separating said back board from said rear surface.

20. The apparatus of Claim 18 further including a reflector on a surface of said back board proximal said rear surface.

10 21. The apparatus of Claim 18 further including a light barrier between said back board and said rear surface.

22. The apparatus of Claim 11 further including a sheet proximal said front surface of said substrate, said sheet having the image to be illuminated and a back board having a reflector, said back board positioned proximal to and
15 separated from said rear surface of said substrate

23. The apparatus of Claim 22 further including a frame in which said substrate, said sheet, and said back board are secured, said frame having an opening for viewing the image.

24. An apparatus for providing backlight illumination of an image, said
20 apparatus comprising:

a means for forming an illumination circuit on a substrate;

a means for supplying power to said illumination circuit; and

a means for backlighting the image.

25. The apparatus of Claim 24 further including a means for blocking a front view of said illumination circuit.

26. A method of providing backlight illumination of an image with an illumination circuit formed on a substrate, said method comprising the steps of:

(a) applying a conductive polymer thick film ink to a plurality of selected portions of a surface of the substrate, said conductive polymer thick film ink forming a plurality of conductive traces;

(b) applying at least one light emitting device to at least one selected portion of said surface, said at least one light emitting device positioned such that each of a pair of terminals is in contact with said conductive polymer thick film ink; and

(c) curing said conductive polymer thick film ink.

27. The apparatus of Claim 26 further including, before said step of applying said conductive polymer thick film ink, a step of applying an opaque border to said surface of the substrate.

28. The apparatus of Claim 26 further including a step of applying an adhesive to said at least one selected portion of said surface, said step of applying said adhesive performed before said step (b) of applying said at least one light emitting device.

29. The apparatus of Claim 26 further including the step of applying a dropping resistor to said substrate, said dropping resistor positioned such that each of a pair of terminals is in contact with said conductive polymer thick film ink.

30. The apparatus of Claim 29 wherein said dropping resistor is a surface mount resistor.

31. The apparatus of Claim 29 wherein said dropping resistor is a resistive polymer thick film ink applied to a selected region of the glass substrate
5 with said resistive polymer thick film ink bridging a gap between two of said plurality of conductive traces.

32. The apparatus of Claim 26 further including a step of applying a power connector to the glass substrate, said power connector having a pair of terminals in contact with said conductive polymer thick film ink.

10 33. The apparatus of Claim 26 further including a step of applying a battery holder to the glass substrate, said battery holder having a pair of terminals in contact with said conductive polymer thick film ink.